

10. Wozniak, V. (2009). Public development and ecology: interconnections, contradictions, crises. *Issues of economics*, 2, 129-136.

QUALITY AND SAFETY OF FOOD AS A COMPONENT OF FOOD OF SAFETY

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As you know, food safety is one of the most important components of economic safety. In legal acts, scientific literature, international documents provide definition of food safety from different points of view. In scientific literature, food safety is treated as an economic category that defines food safety. For example, at the World food conference the term «food safety» was defined as «the availability, at any time, of adequate, nutritious, varied, balanced and moderate world food stocks of basic foodstuffs in order to ensure a steady increase in food consumption and the compensation of production fluctuations and prices» [1].

This definition is also enshrined in article 2 of the Law of Ukraine «On state support to agriculture of Ukraine» [2], which stipulates that food safety is the protection of human life interests, which is expressed in guaranteeing the state of unimpeded economic access of a person to food products in order to maintain its normal life activities.

Scientists also put forward various interpretations of food safety. So, for food safety, Pylypenko K. [3] understands such a state of the economy, in which, irrespective of the world market conditions, a stable supply of people by food is in a quantity corresponding to scientifically substantiated parameters (proposal), on the one hand, and conditions are created to maintain consumption at the level of medical standards (demand) – on the other.

Nemchenko V. [4] defines food safety as an ability to provide the population by food in the conditions of limited financial and environmental capabilities of the state in accordance with scientifically subjected norms, individual characteristics of person and his solvency and price level.

In Goychuk's O. work [5] the food safety is a level of food supply to the population that guarantees socio-political stability in society, the survival and development of the nation, individuals, families, sustainable economic development.

Thus, the analysis of literary sources indicates that food safety in these works is considered as an economic category.

Also, scientists are considering the most important conditions for achieving food safety. So, the work of Pilipenko K. [3] outlines such conditions as the potential physical availability of food for each person (their availability and supply in sufficient quantities); the economic opportunity to purchase food by all social groups of the population, including the poor (the solvency of consumer demand); consumption of high quality products in quantity sufficient for rational nutrition.

According to Ulyanchenko A., Prozorova N. [6] is such conditions as: the population of the country is provided with ecologically clean, full and healthy food products of useful production according to scientifically substantiated norms, and rationality of their consumption, taking into account age, sex, working conditions, climatic conditions and national traditions.

The availability of safe food contributes to the development of the national economy, trade and tourism, food safety and safety of food, and is one of the factors of environment development.

In the context of globalization, urbanization and changes in consumer behaviour, the demand for an ever-widening range of food products is increasing. In order to meet this demand, there is an increase in the intensity and volumes of industrial production in the crop and livestock sectors, which creates both new opportunities and new threats in terms of food safety.

Taking into account the current challenges facing food manufacturers and food industry workers, there is an additional responsibility for ensuring the quality and safety of food [7].

Consequently, besides the established economic conditions of the present, the problems of quality and safety of food products are highlighted.

One of the sources of consumer satisfaction in food is cereals, among which cereals are popular. As the object of the research were oats extra flakes «The Power of Hercules» produced by Ltd. «Hercules and K» (Ukraine, Dnipro), then for conducting research it is necessary to analyse normative documents (ND) that regulate the quality and safety of these products. At present, in the territory of Ukraine, the following standards apply to the quality of flakes (Table 1).

The organoleptic method for assessing the quality of food products is based on an analysis of the perception of reality by sensory organs (vision, hearing, smell, touch and taste) without the use of measuring instruments. According to GOST 21149 [9] in oat flakes the following organoleptic parameters are checked: appearance, color, smell and taste, and consistency. The results of the research of the organoleptic parameters of oat flakes «Hercules' Power» are represent in Table 2.

Table 1

Updating of the NS on the quality and safety of flakes

Normative document	The object of standardization and the area of distribution of activities	Actualization
DSTU 4634: 2006 [8]	Concentrates for food breakfasts dry. Flakes of cereals. General technical conditions are valid in Ukraine	from 01 July 2007
GOST 21149-93 [9]	Oat flakes. The specifications are valid in Ukraine	from 01 January 1995
DSTU 4518: 2008 [10]	Food products. Labeling for consumers is valid in Ukraine	from 01 November 2008
from 01 November 2008 GOST 26791-89 [11]	Grain processing products. Packing, marking, transportation and storage is valid in Ukraine	from 01 July 1990
SanPiN 2.3.2.560-96 [12]	Hygienic requirements for the quality and safety of food raw materials and food products are valid in Ukraine	from 24 October 1996
State sanitary norms and rules [13]	Medical requirements for the quality and safety of food products and food raw materials is valid in Ukraine	from 29 December 2012
State hygiene rules and norms [14]	State hygiene rules and norms [14] Regulations of maximum levels of certain pollutants in food products is valid in Ukraine	from 13 May 2013

Table 2

Determination of organoleptic parameters of oat flakes «The Power of Hercules»

Name of the indicator	Characteristic of the indicator	
	according to DSTU 4634: 2006	example
Appearance	Thin, roasted, of various shapes, with a surface with shallow bubbling bloating	Flakes of different shapes, evenly fried with small blobs
Color	From light brown to dark brown of various shades	Flakes of different colors and shades from cream to brown
Smell	The scent is inherent in this type of product with the taste and smell of the additives used - for flakes with additives	A pleasant cereal smell
Taste		Peculiar cereal, not sour, not bitter
Consistency	The consistency crisp, not rigid	Flakes are crisp, not rigid

Thus, extra oat flakes, «Hercules Power» produced by Ltd. «Hercules and K», according to organoleptic parameters, correspond to the requirements of GOST 21149 [9].

According to GOST 21149-93 [9] in oat flakes the following physical and chemical parameters were determined: mass fraction of moisture, acidity, weldability. The results of research are presented in Table 3.

Table 3

Results of researches of physical and chemical indices of oat flake oven extra production quality produced by Ltd. «Hercules & K»

Indicator	Value		Relevance
	normative	measured	
Humidity,% not more than	12,5	11,5	corresponds
Acidity, ° not more than	5,0	4,34	corresponds
Weldability, min.	15	15	corresponds

Thus, corresponds to GOST 21149-93 [9] oat flakes extra produced by Ltd. «Hercules and K» meet the physical and chemical performance.

Food products – the most dangerous from a medical point of view source of harmful substances for a person. The main pollutants of food include a significant amount of substances of chemical nature. Such toxic elements as lead, cadmium, copper, can accumulate in the human body and cause diseases appear gradually, without pronounced symptoms. They are distinguished by high biological activity, oligodynamic action, cumulative properties, the presence of specific, including distant, effects on the body [15].

According to Tkachuk O. and Yakovets L. [16] about 90% of heavy metals, from their total incomes in agroecosystems with mineral fertilizers, accumulate in the soil. The rest can be included in the cycle and enter the crop production, and then to the person. The most widespread heavy metal, which can migrate from the soil to human body – lead, cadmium, arsenic. It is during the introduction of nitrogen fertilizers to the soil (mg / kg): lead – 174,4; copper – 201,9; zinc – 186,4; cadmium – 1,3; mercury – 0,4; and during the introduction of phosphorus (mg/kg): lead – 138,1; copper – 155,1; zinc – 1230,1; cadmium – 2,7; mercury – 4,6. These compounds accumulate in cereals and fodder crops. The most tolerant of heavy metals is winter rye, winter wheat, oats, barley.

Since grain crops are used to produce a significant amount of daily food products for Ukrainian consumers, such as cereals, flour, pasta, bakery confectionery products, the issue of their safety in the content of toxic metals remains important. Only constant control over the content of lead, cadmium, arsenic, mercury, copper, zinc in these food products can protect you from their negative effects, which often does not immediately occur, but is the result of prolonged accumulation (accumulation) of one or another compound to the body of person. The least protected category of the population needs special protection – children whose body is most affected by low-quality and harmful food products.

The most dangerous toxic element is cadmium, in relation to which it can

be said that it is a carcinogen that kills slowly. To its negative action, first of all, include damage to the central nervous system, liver and kidneys, negative effects on phosphorous-calcium metabolism and causing the destruction of bone tissue, etc. Almost inferior to cadmium for their toxicity, mercury and arsenic. Mercury is a submersible metal, if for a long time, gradually, about 200 mg, comes to the human body, one can cause of early symptoms of poisoning – a defeat of the sensory part of the nervous system, which may be accompanied by a loss of sensitivity of the skin. Also, mercury can cause hearing impairment, blindness, coordination problems. Arsenic is the most affected by the digestive and nervous systems. Copper and zinc are the micronutrients that are needed by a person for normal livelihoods, but they become dangerous when they get an excessive amount of body. In this case, they poison the human body and cause it a series of negative changes – accelerated process of aging, there is a mental retardation, etc [16].

Oat flakes can undoubtedly be called the leader when we speak about the daily breakfast of Ukrainians. The speed of cooking, a wide assortment of products with a different price, many recipes, high consuming value make them very popular in the diet of adults and children. Therefore, the research of the content of toxic metals in oat flakes is the most actuality in present.

The content of toxic elements in oat flakes should not exceed the permissible levels established by medical and biological requirements and sanitary norms of quality of food raw materials and food products. No. 5061-89 dated August 1, 1988 Sanitary regulations and norms SanPiN 2.3.2.560-96 «Hygienic requirements for quality and safety food raw materials and food products»[12].

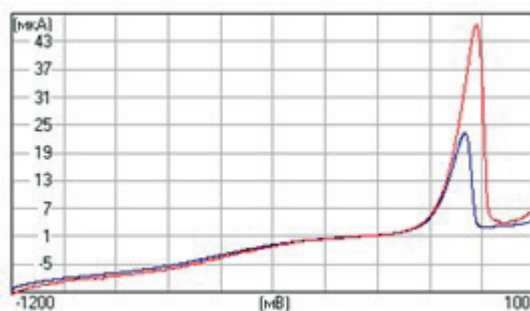


Fig. 1. Voltamperogram of the analyzed solution of flakes

Voltammetric method was used to determine the content of heavy metals in experimental samples of oat flakes based on the registration and research of the current dependence flowing through the electrolytic cell from the external superimposed voltage. Graphic representation of this dependence is called voltamperogram. At the first stage, preliminary preparation of a special solution from experimental flakes was carried out, and in the second stage – an own voltammetric research was

conducted. Voltamperogram analysis provides information on the qualitative and quantitative composition of the solution analyzed (in particular, on the content of lead, cadmium, copper) (Fig. 1).

The results of determination of the content of toxic elements in oat flakes extra «Hercules Power» produced by Ltd. «Hercules and K» are given in Table 4.

Table 4

Results of determination of the content of toxic elements in oat flakes, mg / kg

Name	Value	
	permissible levels [12]	measured
Contents: - lead	0,5	0,0758
- cadmium	0,1	0,0345
- copper	10,0	3,32

The test example is fixed 0,0758 mg/kg of lead (acceptable level – 0,5 mg/kg), 0,0345 mg/kg of cadmium (acceptable level – 0,1 mg/kg) and 3,32 mg/kg copper (acceptable level – 10,0 mg/kg). Thus, a test sample of oat flakes contains lead 6,5 times lower than acceptable level, cadmium – 2,8 times less, and copper – less than 3 times.

Consequently, the analysis of the results of the research of the content of toxic elements in the oat flakes of extra production by Ltd. «Hercules and K» showed that this food product meets the requirements of GOST 21149-93 [9] and SanPiN 2.3.2.560-96 [12] according to measured safety parameters.

References:

1. Trade reforms and food safety: understanding relations. 2003. FAO, UN.
2. The Law of Ukraine of 24 July 2004 № № 1877-IV «On the state power party of the state government of Ukraine» [ONLINE] Available at: <http://zakon.rada.gov.ua/laws/show/1877-15>. [Accessed 04 January 2019].
3. Pilipenko, K. (2014). Food safety in the state – social and economic directions. 2 (53) Issue. 239-243.
4. Nemchenko, V. Food safety of Ukraine. [ONLINE] Available at: <http://econjournal.vsau.org/files/pdfa/849.pdf>. [Accessed 04 January 2019].
5. Goychuk, O. 2004. Food safety: monograph. Zhytomyr: Polissya.
6. Ulyanchenko, A., Prozorova, N. Food safety is the basis of national safety state [ONLINE] Available at: http://congressworld.com.ua/blog_article.php?id=5. [Accessed 04 January 2019].
7. Food safety. [ONLINE] Available at: <https://www.who.int/ru/news-room/>

fact-sheets/detail/food-safety. [Accessed 04 January 2019].

8. Concentrates for breakfast cereals are dry. Flakes of cereals. General technical specifications DSTU 4634: 2006 [ONLINE] Available at: <http://ses-help.org.ua/dstu.pdf> - title from the screen. [Accessed 04 January 2019].

9. Oatmeal flakes. Technical conditions. GOST 21149-93 [ONLINE] Available at: http://www.btp.net.ua/21149_93.html - title from the screen. [Accessed 04 January 2019].

10. Food products. Labeling for consumers. DSTU 4518: 2008 [ONLINE] Available at: <http://www.klubok.net/Downloads-index-req-viewdownloaddetails-lid-311.html>. [Accessed 04 January 2019].

11. Grain processing products. Packaging, labeling, transportation and storage. GOST 26791-89. [ONLINE] Available at: <http://docs.cntd.ru/document/gost-26791-89>. [Accessed 04 January 2019].

12. Hygienic requirements for the quality and safety of food raw materials and food products. SanPiN 2.3.2.560-96 [ONLINE] Available at: <http://docs.cntd.ru/document/905243>. [Accessed 04 January 2019].

13. State Sanitary Norms and the Rules of Medical requirements for the quality and safety of food products and food [ONLINE] Available at: <https://zakon.rada.gov.ua/laws/show/z0088-13>. [Accessed 04 January 2019].

14. State Hygiene Rules and Regulations Regulations on the maximum levels of certain pollutants in food [ONLINE] Available at: – Access mode: <https://zakon.rada.gov.ua/laws/show/z0774-13>. – title from the screen. [Accessed 04 January 2019].

15. Smolar, B. Modern problems of food toxicology [ONLINE] Available at: – Access mode: http://medved.kiev.ua/arhiv_mg/st_2000/00_3_13.html. [Accessed 04 January 2019].

16. Tkachuk O., Yakovets L. 2016. Features of contamination of grain products by heavy metals in the Vinnytsia region, 4 Issue, 179-186.